

RELEASE OF 'COYNE' GREAT NORTHERN BEAN

C.A. Urrea¹, J.R. Steadman², M.A. Pastor-Corrales³,
D.T. Lindgren² and J.P. Venegas²

¹University of Nebraska, Scottsbluff, NE 69361; ²University of Nebraska, Lincoln, NE 68583;
and ³USDA-ARS, Vegetable Laboratory, Beltsville Agricultural Research Center,
Beltsville, MD 20705-2350,

The Agricultural Research Division, University of Nebraska announces the release of the great northern common bean (*Phaseolus vulgaris* L.) cultivar 'Coyne'. Coyne was developed by the dry bean breeding program at the University of Nebraska Agricultural Research Division and tested as NE1-06-12. It is named in honor of Dermot P. Coyne who was the bean breeder at the University of Nebraska for about 30 years before retiring in 2001. He died in 2002. During his career at the University of Nebraska, Dr. Coyne and his cooperators developed 22 dry bean releases. Dr. Coyne was noted for his work on the genetics of resistance to bacterial diseases and several of the lines he developed are included in the pedigree of this cultivar.

Coyne was bred specifically for enhanced resistance to common bacterial blight (CBB), a major seed borne disease of common bean caused by the bacteria *Xanthomonas campestris* pv. *phaseoli* (Smith) Dye [Syn. *X. axonopodis* pv. *phaseoli* (Smith) Vauretin et al.] (*Xcp*), bean common rust *Uromyces appendiculatus* (Pers.:Pers) Unger, and for adaptation to Nebraska common bean growing conditions.

Coyne is a F_{7:8} line derived from a three-way cross (G95023/WeiHING//BMN-RMR-11). G95023 is a great northern line developed by the Michigan Agricultural Experiment Station derived from G91213/7/G90123/P86295/3/WM1-85-45/Sierra/P86241/4/90MS-36/G2913. BMN-RMR-11 is a great northern line developed by the USDA-ARS, Beltsville, MD, Michigan Agricultural Experiment Station and the University of Nebraska Agricultural Research Division that combines four genes for resistance to the bean common rust pathogen (*Ur3*, *Ur4*, *Ur-6* and *Ur-11*), with two genes for resistance to the viruses BCMV and BCMNV. BMN-RMR-11 was derived from bulked F₅ generation from Kodiak/9/P94232*2/8/92 BR-3-10-1084B/7/BR3-1006B/6/88-011-03*2/5/Aztec/4/87-039-34*2/3/POX10/Fiesta/PI 190078. 'WeiHING' is a great northern cultivar derived from a cross between two great northern breeding lines (NE6-91-115 and NE6-91-73) from the University of Nebraska dry bean breeding program. WeiHING has the *Ur-3* and *Ur-6* rust-resistance genes and resistance to the halo blight pathogen [*Pseudomonas syringae* pv. *phaseolicola* (Burkholder) Young et al.] in Nebraska combined with partial avoidance to white mold due to its upright and porous plant architecture. WeiHING also has excellent seed quality and possesses the *I* gene for resistance to BCMV. Coyne has high yield potential, broad adaptation to Nebraska, and good seed quality while maintaining rust and bean common mosaic virus resistance.

Disease Resistance: Reaction of Coyne to *Xcp* was consistent across three years at the WCREC, North Platte, NE, where field disease ratings of 3.62, 3.5, and 4.4 were recorded in 2005, 2006 and 2007, respectively. This was similar to reaction of Marquis (2.5, 4.1 in 2006 and 2007, respectively) and Beryl-R (1.7, 4.5, and 5.4 in 2005, 2006, and 2007, respectively). Conversely, the susceptible great northern, Orion, scored 6.0, 8.5 and 9.0 in 2005, 2006 and 2007, respectively.

Difference in CBB reaction among sources of CBB resistance (USPT-CBB-1, ABCP-8, ABC-Weihsing, and Neb#1-Sel-27) and Coyne was not significant. Coyne carries the SAP 6 SCAR marker linked with major QTL for CBB resistance derived from Montana No. 5 (via Weihsing).

Inoculation of Coyne with races 41, 44, 47, 49, 53, 67, 73, and 108 under greenhouse conditions at Beltsville, MD from 2005-2007, provided evidence for the presence of *Ur-3* and *Ur-6* genes for resistance to common bean rust. Coyne also carries the SK14 SCAR marker linked to the QTL for *UR-3* common bean rust resistance gene.

Based on top necrosis reaction to *NL-3* strain of BCMNV, it was determined that Coyne carries the single dominant hypersensitive *I* gene that provides resistance to all non-necrotic strains of BCMV, but is hypersensitive to the temperature-dependent necrosis-inducing strains of BCMV and to the temperature-independent necrosis inducing strains of BCMNV. Coyne has the same partial avoidance to white mold [*Sclerotinia sclerotiorum* (Lib.) de Bary] as Weihsing due to its semi-upright and porous plant architecture in field nurseries.

Agronomic Characteristics: Coyne exhibits a semi-upright Type 2b indeterminate growth habit. Plants averaged 57 cm in height during 2007 with excellent lodging resistance. Coyne has white flowers and blooms 44 d after planting. Coyne is a midseason bean maturing 91 d after planting and ranging in maturity from 90-92 days. The seed coat of Coyne is bright white.

Yield Performance: Average seed size for Coyne (36.2 g 100 seeds⁻¹) was slight larger than Orion (34.9 g 100 seeds⁻¹) and Beryl-R (29.3 g 100 seeds⁻¹) in the intermediate, advanced, and growers' field trials grown from 2005-2007. For the same trials, Coyne (2,819 kg ha⁻¹) had a slightly higher yield than Marquis (2,758 kg ha⁻¹).

Availability: Husker Genetics Foundation Seed Program, University of Nebraska-Lincoln (UNL), will maintain a small quantity of Breeder Seed of Coyne. An application will be filed for cultivar protection under Title V of the U.S. Plant Variety Protection Act. A small quantity of seed of NE1-06-12 for research purposes will be available from the corresponding author for the first five years. UNL approval will be required to market a new cultivar that is 25% or more Coyne. This will include a negotiated license agreement and fee structure. We ask that appropriate recognition of source be given when this cultivar contributes to the development of a new cultivar.

ACKNOWLEDGEMENTS

We are grateful for the financial support from the Nebraska Dry Bean Commission and the College of Agriculture Sciences, University of Nebraska-Lincoln. We thank Phillip Miklas for the Bean common mosaic virus evaluation. The authors thank Pat Lambrecht, Clay Carlson, and James Schild for technical help and support, and Ann Koehler for editing assistance.